Multi-layered Semantic Frame Analysis
Links Language to World Knowledge

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Linguists are a strange kind of people: they always rely on "world knowledge" to interpret any sentence, but they *do* deny they did it. This way, they've been trying very hard to keep linguistic knowledge, or "grammar," from contaminated by world knowledge, and impoverished the semantic description of a given natural language spectacularly. This is why traditional semantics in linguistics, whether generative or cognitive, didn't come very close to anything useful and insightful to **describe what people really have in their minds when they understand sentences** (or utterences, if you like).

Based on our previous work, we propose a new framework for linguistic analysis, called **Multilayered Semantic Frame Analysis (MSFA)** which has the following characteristics:

MSFA enables linguists to (i) specify precisely **what is understood when a sentence is understood**, (ii) linking language to world knowledge systematically, consistently, and effectively.

With this, linguists are now able to give a "proper characterization" to human linguistic understanding, after all. MSFA is inspired by Frame Semantics [1] and Berkeley FrameNet project [2], on the one hand, and Conceptual Blending [3], on the other.

In MSFA, it is recognized that **interpretation works top-down**, and on this basis, **the strong interpretation of the Principle of Compositionality is rejected**, because it demands that, given a sentence $s = w_1 w_2 \cdots w_n$, all meanings of s come from its proper parts, i.e., $W = \{w_1, w_2, \ldots, w_n\}$, thereby prohibiting any "super-lexical" units from contributing semantically to s.

Instead, the weak interpretation of the principle is assumed, which just says that the meanings of any element in W *needs to* be incorporated, or "inherited" into the meaning of s. Thus, lexical meanings need not "exhaust" the meaning of s. So, super-lexical units —constructions or whatever— are allowed to bear meanings that are irreducible to the meanings of constituent lexical items of s. One of the strongest evidence for this would be the **"attraction to understandable situation" effect** on interpretation, in which "(idealized) situations," described in terms of "semantic frames," function as "attractors" so that all words of s are "forced" to accommodate to each other to "fit" into one of the attractors, evidenced by the way specific interpretations of *X-ga Y-wo osou* (whose English translations vary from *X attack Y*, to *X assault Y*, to *X hit Y*, showing a good deal of polysemy) are "selected" over other possible ones, showing metonymic and metaphoric "resolutions." This strongly suggests that metaphor and metonymy are just "side effects" of such attractions, rather than being "free agents" that drive cognitive processing.

But MSFA goes beyond Construction Grammar, trying to arrive at **Parallel Distributed Semantics**, which embodies a theoretical claim that the meaning of a sentence is, by and large, "distributed" over lexical items. Lexical meanings are gross approximations to such distributed objects.

MSFA is forming a platform for our **semantic role tagging** procedure, which is a prerequisite for our development of a **semantically annotated corpus of Japanese**, thereby making itself a practical framework for semantic annotation that meets the high-quality demanded by many NLP applications.

References

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[2] C. R. Johnson and C. J. Fillmore. The FrameNet tagset for frame-semantic and syntactic coding of predicate-argument structure. In *Proceedings of the 1st Meeting of the North American Chapter of the Association for Computational Linguistics (ANLP-NAACL 2000)*, pp. 56–62, 2000.

[3] G. R. Fauconnier. *Mappings in Thought and Language*. Cambridge, MA: Cambridge University Press, 1997.